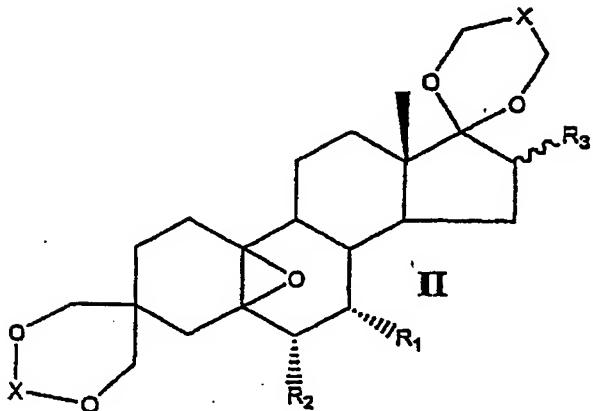


What is claimed is:

1. Compounds of formula (II):

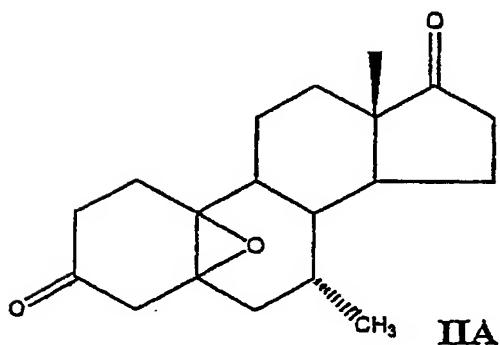


where X is selected from nothing, C(CH₃)₂, and CH₂; R₁ is selected from CH₃, H, and COOCH₃; R₂ is selected from CH₃, F, and H; and R₃ is selected from CH₃, OH,

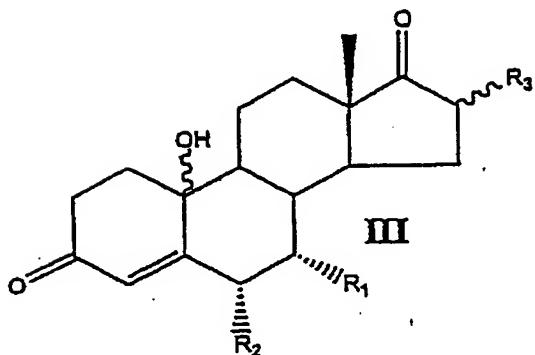
5 F, and H.

2. Compound of claim 1 where X = C(CH₃)₂ and R₁ = CH₃, R₂ = R₃ = H.

3. Compound of formula (IIA):



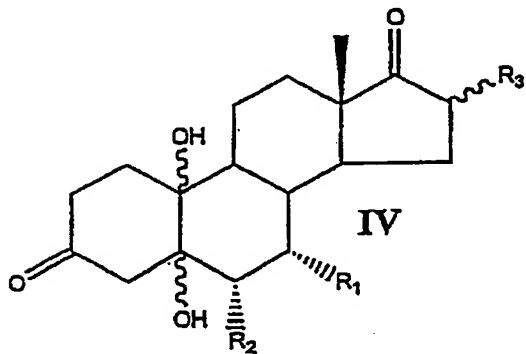
4. Compounds of formula (III):



where R₁ is selected from CH₃, H, and COOCH₃; R₂ is selected from CH₃, F, and H; and R₃ is selected from CH₃, OH, F, and H.

5 5. Compounds of claim 4 where R₁ = CH₃, R₂ = R₃ = H; or where R₁ = R₂ = R₃ = H.

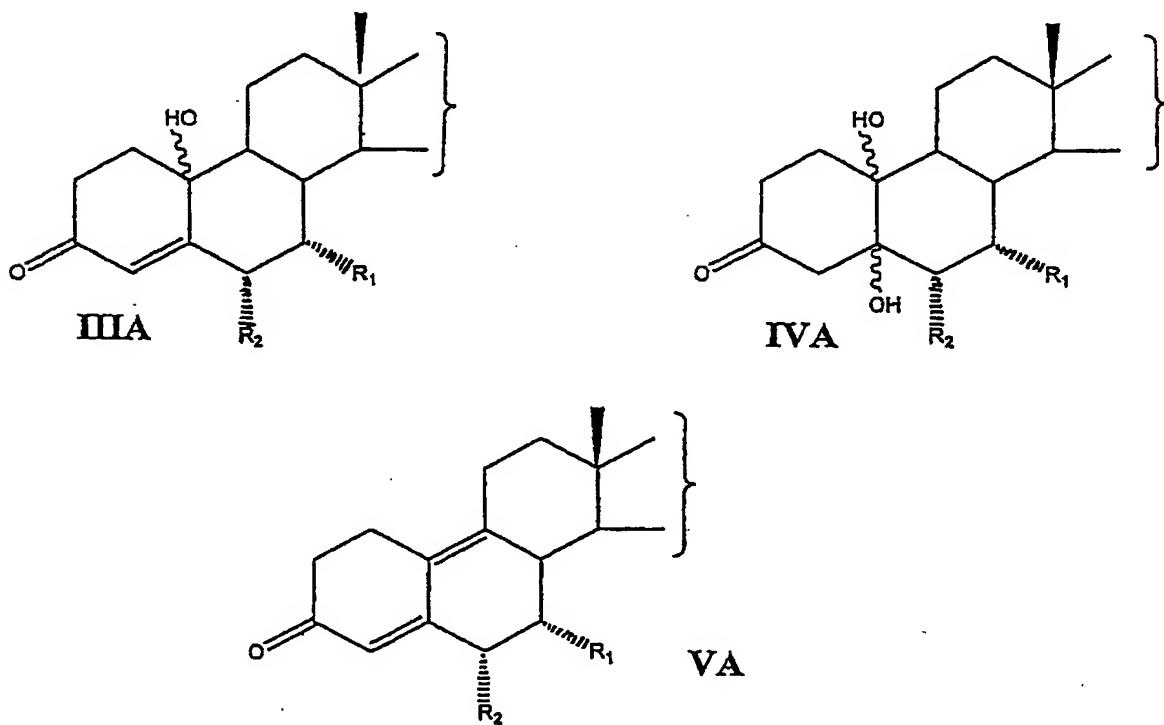
6. Compounds of formula (IV):



10 where R₁ is selected from CH₃, H, and COOCH₃; R₂ is selected from CH₃, F, and H; and R₃ is selected from CH₃, OH, F, and H.

7. Compounds of claim 6 where R₁ = CH₃, R₂ = R₃ = H; or where R₁ = R₂ = R₃ = H.

8. A process for preparation of a steroid having the 4,9(10)-diene-3-one structure, and derivatives thereof, having the formula (VA), which comprises contacting a steroid selected from the group consisting of 10-hydroxy-4-ene-3-ketosteroids (IIIA), 5,10-dihydroxy-3-ketosteroids (IVA), and mixtures of (IIIA) and (IVA), with concentrated sulfuric acid or moderated sulfuric acid, the moderated sulfuric acid comprising a mixture of the concentrated sulfuric acid and water in an amount of up to 5% by volume of the moderated acid, or a mixture of the concentrated sulfuric acid and a second acid in an amount of up to 30% by volume of the moderated acid,



10

where R₁ is selected from CH₃, H, and COOCH₃; and R₂ is selected from CH₃, F, and H.

9. A process according to claim 8 where estra-4,9(10)-diene-3,17-dione (VA) is prepared from a steroid selected from the group consisting of 10-hydroxy-estra-4-ene-3,17-dione (IIIA), 5,10-dihydroxy-estra-3,17-dione (IVA), and mixtures thereof.

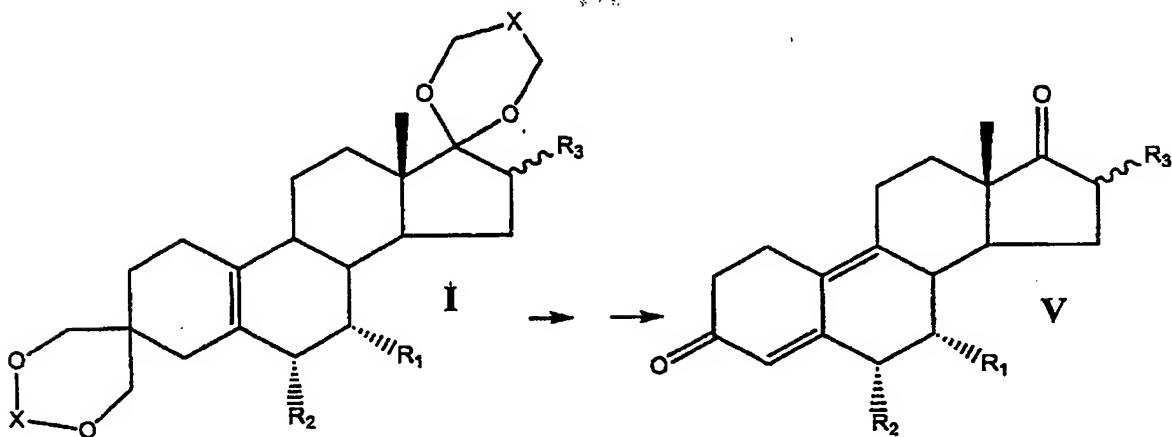
5

10. A process according to claim 8 where 7α -methyl-estra-4,9(10)-diene-3,17-dione (VA) is prepared from a steroid selected from the group consisting of 10-hydroxy- 7α -methyl-estra-4-ene-3,17-dione (IIIA), 5,10-dihydroxy-estra-3,17-dione (IVA), and mixtures thereof.

10

11. A process according to claim 8 where the steroid is contacted with the concentrated sulfuric acid.

12. A process for preparation of steroidal estra-4,9(10)-diene-3,17-diones of structure (V):



where X is selected from nothing, C(CH₃)₂, and CH₂; R₁ is selected from CH₃, H, and COOCH₃; R₂ is selected from CH₃, F, and H; and R₃ is selected from CH₃, OH, F, and H; where the process comprises:

- (a) contacting estra-5(10)-ene-3,17-dione-3,17-bis-ketal (I) with an epoxidizing agent;
- (b) contacting the epoxide product of step (a) with dilute acid; and
- (c) contacting the product of step (b) with concentrated sulfuric acid or moderated sulfuric acid, the moderated sulfuric acid comprising a mixture of the concentrated sulfuric acid and water in an amount of up to 5% by volume of the moderated acid, or a mixture of the concentrated sulfuric acid and a second acid in an amount of up to 30% by volume of the moderated acid.

13. A process according to claim 12 where 7 α -methyl-esta-4,9(10)-diene-3,17-dione (V) is prepared from a steroid selected from the group consisting of 7 α -methyl-esta-5(10)-ene-3,17-dione-3,17-bis-ethylene glycol ketal (I), 7 α -methyl-esta-5(10)-ene-3,17-dione-3,17-bis-neopentyl glycolketal (I).

20 14. A process according to claim 12 where the epoxidizing agent is m-chloroperbenzoic acid or peracetic acid.

15. A process according to claim 12 where the product of step (b) is contacted with the concentrated sulfuric acid.

5 16. A process according to claim 12 where the product of step (b) is contacted with the moderated sulfuric acid, and where the moderated sulfuric acid comprises a mixture of the concentrated sulfuric acid and concentrated phosphoric acid.

10 17. A process according to claim 12 where estra-4,9(10)-diene-3,17-dione (V) is prepared from a steroid selected from the group consisting of estra-5(10)-ene-3,17-dione-3,17-bis-ethylene glycol ketal (I), estra-5(10)-ene-3,17-dione-3,17-bis-neopentyl glycolketal (I).

15 18. A process for preparation of steroidal estra-4,9(10)-diene-3,17-diones of structure (V) by treatment of steroidal estra-5(10),9(11)-diene-3,17-diones of structure (VI) with concentrated mineral acid.

19. A process according to claim 18 where the mineral acid is concentrated phosphoric acid.